

The logo features a stylized yellow and blue swoosh that forms a partial circle around a white and blue arrow pointing upwards and to the right.

HIGH SPEED FLIGHT BULLETIN

July/August 2022

From the Chairman's Desk and Cockpit:

Dear Friends and Colleagues:

Welcome onboard the 2022 High-Speed Flight-FastForward Bulletin.

By now, many, if not all of us, have watched Top-Gun Maverick once or multiple times. Indeed, it is a great movie with flying, action, and human story lines that appealed to high-speed flight as much as our humanity, thirty years after the original movie. The F-18 Super Hornet agility and performance are truly remarkable. The F-14 final scenes, and some others as well, had many of us shed a tear, or two. What is also remarkable is the fact that the F-14 and F-15's Mach 2.3 top speed is much higher than the Super Hornet's M 1.8. This fact should motivate all of us to work even harder to achieve faster flight now and in the future.



The Farnborough Air show surprised us positively with HSAT developments. Most important, in my opinion, was the series of events, panels, and sessions addressing Space Point to Point (P2P) in close collaboration with HSAT-FastForward Strategic Partner the Global Spaceport Alliance (GSA). I was honored to partake in one of the recorded sessions as a panel moderator to speakers from the FAA (Pam Underwood), Sierra Space (Steve Lindsey), and New Frontier Aerospace (Jess Sponable). In my over 40 years of attending the Farnborough and Paris Air shows, this year was the most pointed and widespread coverage of HSAT, with particular focus on, Suborbital an Orbital. There are plenty of references and recordings of the panels.

Another positive and widely covered event at Farnborough was BOOM's release of its Overture supersonic transport category aircraft. The Overture is equipped with four engines, an ultra-sleek design, a promise to carry 80+ passengers over 4,500NM with IFR reserves, quietly and cleanly (100% SAF). Still, at Mach 1.4 it is certainly slower than the Mach 2.2 operational Concorde that it replaces two decades later. Once more, the engines available

are falling short of what is needed. Time will tell whether a first step Sub-M2.0 commercial vehicle will suffice, or if the market will opt to wait for a M2+ solution to enhance the number of trips per day and thus available seat miles for the sub-100 passengers' cabins proposed.

This takes me to another important moment in the supersonic industry, the sale at auction of the assets of the Aerion Supersonic program. By the time this bulletin is published, the Assignment for the Benefit of Creditors (ABC) process will have taken place and we might have a new owner for the more than half dozen airframe, wing, and GE Affinity Mach 1.4-1.8 capable engine and nacelle integration technologies. Stay tuned, we will be very busy with the resurgence of this program throughout 2022. As I have shared with you, I hope the new Aerion program leaps straight into the AS-4 Hypersonic vehicles that was advertised just before the program was paused in 2021. Go Aerion, see you again around HSAT circuits soon.

Commercial supersonic and hypersonic programs are aligning, no surprise, with the military-defense complex for funding and markets; BOOM with Northrop Grumman, and Hermeus with Lockheed Martin. Will we see the Virgin M 3.0 supersonic design align with another primer? I would not be surprised. Speaking of the military- defense complex, the DOD's Joint Hypersonic Technology Office (JHTO) and its University Consortium for Applied Hypersonic (UCAH) are making great progress, under Texas A&M Dr. Rodney Bowersox's dynamic and capable leadership. The UCAH Spring Forum was very well attended, and both academia and industry aligned to make good use of the circa \$30 million in R&D capital awarded in the first half of 2022. This is expected to yield initial results as early as Q3-4 2022, and robust gains beyond.

In addition, NASA's Hypersonic roadmap continues with good momentum and vision. The milestones to hypersonic market, business, and engineering development proceed at a good clip. Our group supports a NASA-overall holistic effort to lead the hypersonic industry's technological development. We have some ideas, and stay tuned, our group might be adding input and value to NASA and related industry stakeholders very soon.

As a second milestone in NASA's business and market case deep dive, Dr. John Olds led Spaceworks Enterprises' (SEI) highly anticipated preliminary supersonic and hypersonic aircraft concept deliverable in September. This document is NASA's second milestone and the precursor of a highly competitive RFP that will be awarded Q4 2022. For all of us who attended the Industry workshop, Day, and one-on-one Q&A sessions, we anticipate one or two teams to win, and will deliver feasible, practical, and most importantly, commercially sound vehicles.

The airspace design, modelling, and implementation for hypersonic and launch and re-entry vehicles blurs in the upper-Class E (>60,000ft) all the way to the Karman Line (~333,333 ft). This segment, preceding HSAT Point-to-Point (PTP) suborbital-orbital stages is the focus of our Working Group's attention, and we are aware of efforts and calls for further research from the private sector, MITRE, and the military-defense complex, DARPA-TTO's, calling for Special Use Airspace (SUA) R&D, and practical demonstrations. Airspace, Environmental Sustainability and Safety Standards, and Best Practices are a clear call to industry

consensus Standards Development Organizations (SDO's) to explore, organize and launch committees and task groups to address them.

I would like to finish this bulletin anticipating the need to “demonstrate” as soon as possible, as many as possible links in the HSAT chain. Demos, Demos, Demos! I am a big fan of the world's first experimental supersonic airplane, the Bede 10 Mach 1.8 kitplane. In the early 90's, I had the chance to witness some of this program's progress and watch it fly. I encourage someone to dust off the design and the program assets and go fly supersonic, test-demo, and repeat.

Nothing whets the appetite of disruptive, creative, and genial investors as demonstrating at an experiential level (flying banners, analog missions, revival of existing projects, record breaking, etc.) the precursors to future vehicles and their enabling technologies. Go, test-a-little-fly-a-little, over, and over.

See you at the FastForward Q3 Call, featuring Australian Hypersonic technology leader [Hypersonix](#) we will talk about this bulletin and much more, don't forget to register for the call and if you wish, donate to the project, to keep it thriving. And also, [please RSVP for our HSAT 5th Edition Workshop to be held at the Midland, Texas Air and Spaceport on December 8-9th](#). This HSAT marks the 15th anniversary of the FastForward Project, and we will do a 15-year aft review and 15 years forward forecast of the HSAT industry, with Hypersonics at the fulcrum of Supersonics and Sub-Orbital P2P speed regimes.

We are only a phone call or email away,
Fly Fast, Fly Safe,...Fly Free!



Oscar S. Garcia
Chairman, HSAT - FastForward Project



[Register for FastForward Group Call](#)



(image credit: NBAA)

TRANSONIC

All General aviation M.9+ programs are reporting strong backlogs and healthy deliveries, as we reported in the May-June 2022 Bulletin. We applaud the great work by the NBAA- and its global affiliates for leading the technical, mediatic, and balanced reports and studies addressing the positive cost-benefit and environmental friendliness of the growing large cabin, long range fast aircraft established fleets. We invite all of you to attend NBAA-BACE in Orlando October 18th-20th and tune in to the lectures, briefings, and workshops that will shed light into the positive impact of business aviation in the USA and the world. We look forward to the business jet deliveries forecasts from Honeywell, JetNet IQ, AMSTAT, and others

[Link to: NBAA-BACE Orlando](#)



(photo credit: David McIntosh (Gulfstream G700))

"The business jets market is projected to grow from an estimated USD 30.1 billion in 2022 to USD 41.8 billion by 2030, at a CAGR of 4.2% during the forecast period. An increasing number of high-net-worth personnel and the replacement of aging aircraft fleets are expected to drive the growth of the market."

The M .925 G700 Super-Fast Long Range and Large Cabin Fleet Flagship is expected to enter service on Q4 2022

[Link to: Markets and Markets Article](#)





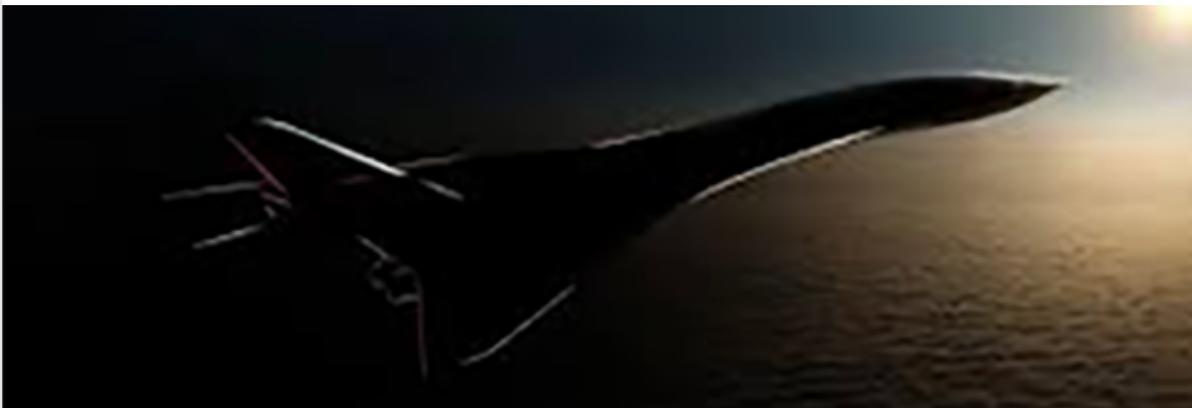
(photo credit: NASA)

SUPERSONIC

We continue to monitor NASA's QueSST-Lockheed Martin's X-59 program developments and follow closely with NASA's very informative [website](#).

The noise standards to remove supersonic overland flying remains the most promising development to truly scale and proliferate HSAT supersonic and hypersonic around the world, and to capitalize on hundreds of high-speed routes, catering to millions of passengers and requiring hundreds or even thousands of supersonic and hypersonic vehicles globally. Our group vouches for industry consensus standards developers, industry, users, and markets to consensually agree upon how quiet is quiet enough.

[Link to: NASA Website](#)



(photo credit: Aerion AS3 M 4.0 Concept by Aerion Corp)

The Aerion assets auction scheduled for September 7th is a public process, and the details of the assets to acquire were published by Aviation International News and other aerospace-aviation media. The results of this auction and the future of the Aerion program will be material to the developments of the supersonic general aviation industry. Aerion's airframe and wing technologies applies to a wide swath of high-speed flight regimes from M1.5-4.0, and are an important first step into supersonic aircraft programs commercialization and industrialization.

[Link to: Aerion Auction Information](#)



(photo credit: Boom Supersonic)

BOOM's sleek and powerful looking four-engine Overture raised eyebrows and excitement, and promises to deliver a clean, sustainable transport category and military-defense (AFRX-Presidential Aircraft candidate) platform. A four-engine configuration (Quad) is unusual for a modern air transport category aircraft, and as engine technology develops, perhaps the design will be powered by two engines (Twin) as is the case for all modern and future looking subsonic aircraft. Industry expects with interest the first flight of the "Baby" Boom aircraft in Mojave, California, as a precursor and test bed for many of the technology platforms and systems that will apply to the Overture. The ChinaLake high speed corridor area will be a great test grounds for the future airspace requirements for supersonic acceleration and deceleration points in the National and International airspace systems.

[Register for the HSAT Workshop](#)

QUARTERHORSE
REUSABLE, AUTONOMOUS HYPERSONIC AIRCRAFT

TECHNICAL HIGHLIGHTS

- PROVEN TURBINE-BASED COMBINED CYCLE (TBCC) ENGINE CONCEPT
- INTEGRATED COMMERCIAL OFF-THE-SHELF GE J85-21 TURBOJET
- DIGITALLY ENGINEERED DURABLE AIRFRAME
- PRIVATELY FUNDED

(slide credit: Hermeus Corporation)

HYPERSONIC

Hermeus progress is steady, and we recommend that industry follows its developments on its very well presented and informative digital media, and live events. Hermeus record breaking fund raising from the US Air Force, AFRL, AFWRX, Presidential and Executive Airlift Directorate. This extraordinary funding achievement doubles down on the cross-commercial-military-defense complexes that are essential for the hypersonic transportation program's ecosystem scalability, speed-to-market-military theatres, reliability, effectiveness , and profitability.

[Link to: Hermeus](#)



(photo credit: Hypersonix)

We mentioned Hypersonix is the Q3 FF call presenter and encourage you to visit their webpage and recent news and press releases on their innovative powerplant and airframes at the edge of hypersonic flight and air-launch.

The hypersonic industry realities call for international collaboration with ITAR- safe and friendly countries. Given Australia's location and distance from global hubs such as London and New York, it is very appropriate to have local industry like Hyperosnix focused on solving the hypersonic transportation challenge as well as collaboration with leading US defense prime contractors.

[Link to: Hypersonix](#)



(photo credit: Stargazer, Venus Aerospace)

We are also watching with great interest the developments of Seattle- based New Frontier Aerospace's VTOL Hypersonic vehicles. The trio of Houston- based Venus Aerospace,

and its [Mach 9+ Stargazer hypersonic-spaceplane vehicle](#), and Dallas-based Exos Aerospace and Firehawk Aerospace are in different ways addressing the most critical element to enable hypersonic flight; the powerplant. More to follow on these and other hypersonic vehicle developments, the State of Texas and its high-speed flight hubs in Houston, Midland, and Brownsville-Boca Chica.

[Link to: New Frontier Aerospace](#)

[Link to: Venus Aerospace](#)

[Link to: Exos Aerospace](#)

[Link to: Firehawk Aerospace](#)



[Register for the HSAT Workshop](#)

HSAT SPACE

Kudos to [Farnborough International Air show](#) and its organizers for their foresight and awareness of the Point-to-Point Space Suborbital and Orbital transportation vistas for the future. Well over 80,000 attendees were informed about Space P2P, and we certainly look forward to the Paris Air show organizers to follow suit in 2023 at Le Bourget. We will be there, ready to help and inform.

We applaud our friends and research and education strategic partners, the [Global Spaceport Alliance](#) and the [Commercial Spaceflight Federation](#), and their efforts to secure Federal Space Transportation Infrastructure Matching (STIM) grant funding for spaceports across the nation. Even though the request was not fulfilled for FY 23, the CODELS from the Spaceports' States are more and more aware of the need for ground and airspace infrastructure development. The FAA-AST received a significant funding increase of \$14.9 million for a total of \$33.675 million in FY 23. The additional funding is thought to be aimed at technology R&D, airspace integration (\$10 million), and human spaceflight safety and research (\$5.7 million), which are foundational areas to future P2P Suborbital and Orbital space transportation.



[Link to: Spacepolicy Online](#)

SUBORBITAL

A lot is happening in Suborbital industry world, and most, if not all of it, is good for future P2P spaceflight. Virgin Galactic appointing former Delta Airlines executive Mike Moore as EVP, Spaceline Technical Operations shows sharp vision and mission to ensure airplane-like programmatic viability of their suborbital vehicles and flight operations. Moore will lead Virgin Galactic's technical operations and maintenance team in charge of ensuring the company's vehicles are ready for flight. As part of this new position, he will help design and implement the operational model and technical infrastructure needed to support high cadence spaceflights during commercial service. Moore will report to CEO Michael Colglazier.

[Link to: Business Wire Article](#)



(graphic credit: Brycetekh)

Blue Origin's flight operations and launch site development in terms of flight cadence and employment base keep building a strong and effective platform for suborbital safe, reliable, and financially viable flying. Several initiatives have been set in motion by peripheral industry players; Space Nation, and 0-G Launch. Stay tuned for future Bulletins on this subject of Spaceflight P2P "aero derivatives" to give more and more people access to Suborbital flying deriving from these up-and-down flights. This paves the ground for cross-range, or P2P appetite to go somewhere through Suborbital space. Much like the first powered aircraft gave rides to eager flyers at the dawn of aviation, paving the ground for point-to-point transportation in the early 1900's.

[Link to: Space Nation](#)

[Link to: 0-G Launch](#)



(photo credit: Dawn Aerospace)

Internationally, Dawn Aerospace keeps making progress with the Aurora MK-II flight demonstrator, with a dozen or so jet-powered demonstration flights. Demo, Demo, Demo, as we preach...Dawn's investment base understands the jet powered flights as proxies

for the rocket motor-powered iterations, and thus they keep investing to enable the logical powerplant transition. Well done Dawn Aerospace, Stefan, Jeroen and teams in the Netherlands and New Zealand.

[Link to: Dawn Aerospace Mk-II Aurora](#)



(slide credit: Exploration Architecture Corporation (XArc))

ORBITAL

We continue to monitor SpaceX's Starship Orbital mission launch from Boca-Chica, West Texas. The FAA-AST environmental sign-off for the mission has been awaited by industry, academia, and also the mainstream markets due to the importance of the mission for future orbital P2P. We will monitor the research aimed to measure emissions, volatility, and safety of the public and to continue prioritizing its research on the explosive yield and environmental effects of LOX/methane on public health and safety. Let's keep an eye on this important and critical area.

We also applaud Sierra Space's continued licensing of Dreamchaser recovery spaceports (Spaceport America, Spaceport Huntsville, et al). Each Dreamchaser potential landing at a point other than the launch site constitutes a beam of light toward future P2P of an orbital winged vehicle.

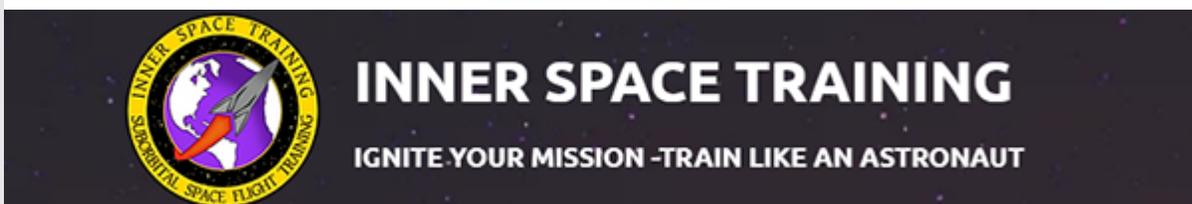
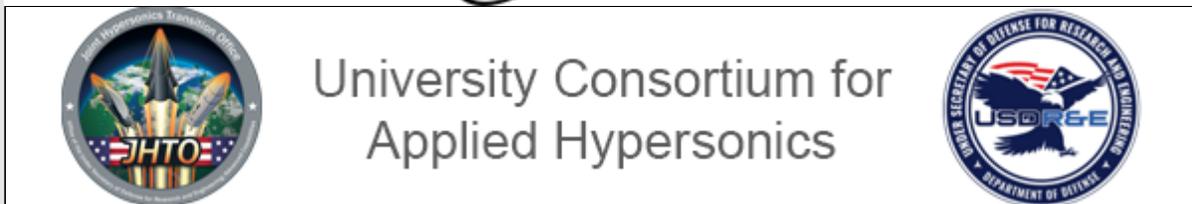
Our FF Q2 Call in July, focused on the US TRANSCOM's exploratory demand signal for Orbital space transportation P2P for the unit. This was a very well attended call and has triggered interest to ascertain exploratory demand signals for hypersonic P2P transportation as well. Stay tuned, as we facilitate and support the dialogue with multiple parties on this key market-demand-mission requirements pulling force. The call featured XArc's Founder and CEO Sam Ximenes, and the US Transcom Orbital Transportation project leader Mike Surina, and focused on the Collaborative Research and Development Agreement (CRADA) between USTRANSCOM, and XArc, similar to the CRADA's with Blue Origin and Space X and the USTRANSCOM. Overall, the results of the study led to some of the challenges and opportunities that industry and the military-defense complex face, including; ground and airspace infrastructure, Federal-State and Local funding in tandem with industry.

[Link to: Exploration Architecture](#)

[Link to: USTRANSCOM](#)

Our group and its strategic partners, look forward to supporting future CRADAS with the USTRANSCOM to further the program and its possible platforms yielding, you guessed it: Demos, Demos, Demos! Stay tuned for more.

In conclusion, we are as always bullish on the demand signal from the markets, users, producers, and industry “pulling” for safe, reliable, and FAST air transportation. We will keep working with innovators, investors, regulators, legislators, and all stakeholders on making the world “smaller” and, as a result, better and happier.



For More input on HSAT throughout this month and going forward, follow us on LinkedIn and Comment on the Postings



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